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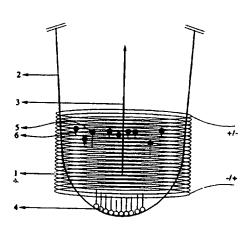
(74) Agent: NOONAN, Kevin, E.; Banner & Allegretti, Ltd., Ten South Wacker Drive, Chicago, IL 60606 (US). (81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).

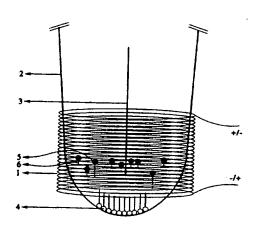
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#### (57) Abstract

The invention provides an apparatus for performing a process for amplification of specific nucleic acid sequences based upon the separation of nucleic acid strands by an electromagnetic field. This means of separation allows the use of mesophilic polymerases in the amplification process, thereby increasing the speed and fidelity of the amplification process, as well as the size of target nucleic acid that can be amplified.

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## INTERNATIONAL SEARCH REPORT

In stional Application No PCT/US 95/16256

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A. CLASS IPC 6	SIFICATION OF SUBJECT MATTER C12Q1/68 B03C1/28 B01J19	/00	
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C. DOCUM	MENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the	relevant passages	Relevant to claim No.
P,X	WO,A,94 29484 (IMAGEN INCORP) 2	2 December	2-4
	cited in the application see the whole document		
A	WO,A,91 09308 (HOLMES) 27 June 1 see page 8, line 17 - page 9, l figure 1		1
A	WO,A,90 14891 (DYNAL A.S.) 13 De 1990 see figure 1	ecember	1
A	WO,A,93 15224 (SCIENTIFIC GENER) August 1993 see the whole document	CS LTD.) 5	∠- <b>4</b>
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## INTERNATIONAL SEARCH REPORT

Intr ional Application No PCI/US 95/16256

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	cition) DOCUMENTS CONSIDERED TO BE RELEVANT  Citation of document, with indication, where appropriate, of the relevant passages	<del></del>	Relevant to claim No.
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<b>A</b>	WO,A,93 09250 (ADELAIDE CHILDREN'S HOSPITAL) 13 May 1993 see the whole document		2-4
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## INTERNATIONAL SEARCH REPORT

Information on patent family members

In' tional Application No PCT/US 95/16256

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Publication date			Publication date
22-12-94	AU-B-	7106794	03-01-95
	EP-A-	0702728	27-03-96
27-06-91	AT-T-	114047	15-11-94
	AU-B-	642186	14-10-93
	AU-B-	6879391	18-07-91
	CA-A-	2072135	08-06-91
	DE-D-	69014130	15-12-94
	DE-T-	69014130	23-03-95
	EP-A-	0504192	23-09-92
	ES-T-	2064074	16-01-95
	JP-T-	5502294	22-04-93
13-12-90	NONE		
05-08-93	AU-B-	3362893	01-09-93
	CA-A-	2128686	05-08-93
	EP-A-	0636185	01-02-95
	JP-T-	7503370	13-04-95
13-05-93	AU-B-	667846	18-04-96
	BR-A-	9206705	21-11-95
	CA-A-	2122450	13-05-93
	EP-A-	0672173	20-09-95
	22-12-94 27-06-91 13-12-90 05-08-93	22-12-94 AU-B-EP-A- 27-06-91 AT-T-AU-B-AU-B-CA-A-DE-D-DE-T-EP-A-ES-T-JP-T-  13-12-90 NONE  05-08-93 AU-B-CA-A-EP-A-JP-T-  13-05-93 AU-B-BR-A-CA-A-	22-12-94 AU-B- 7106794 EP-A- 0702728  27-06-91 AT-T- 114047 AU-B- 642186 AU-B- 6879391 CA-A- 2072135 DE-D- 69014130 DE-T- 69014130 EP-A- 0504192 ES-T- 2064074 JP-T- 5502294  13-12-90 NONE  05-08-93 AU-B- 3362893 CA-A- 2128686 EP-A- 0636185 JP-T- 7503370  13-05-93 AU-B- 667846 BR-A- 9206705 CA-A- 2122450